

Breakthrough Vacuum Technology Achieves 97%⁺ MTBE Removal Efficiency From Groundwater



LSTE-10

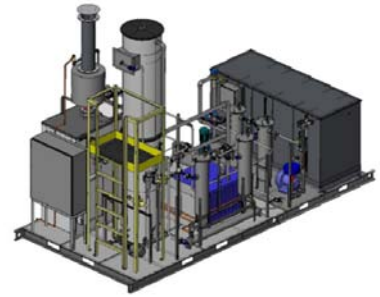
Liquid Separation Technologies and Equipment, LLC.

27405 Puerta Real, Suite 235

Mission Viejo, California 92691

www.LST-Equip.com

Office: 949-367-1855



Liquid Separation Technologies and Equipment, LLC. has patented and patent-pending designs that mechanically separate various compounds from groundwater contamination utilizing each contaminant's unique chemical and physical properties. The technology can be configured and equipped for a single-phase application such as liquids or vapors, or in a dual-phase application to treat both groundwater and soil vapor.

The key to the LSTE-10 ability to achieve 97%⁺ removal efficiency for MTBE is its patent-pending multi-chambered vacuum aeration tank ("VAT") and high vacuum separator tower. In the VAT, contaminated groundwater is maintained under a vacuum and gently aerated with 8 SCFM of air for 15 to 60 minutes. This low vacuum retention time can be varied according to the MTBE concentration in the groundwater and the discharge requirements.

After VAT treatment, the groundwater is then routed to the high-vacuum separator column. In this column, the groundwater is atomized under approximately 27-inches of mercury vacuum (no packing is employed). Due to the high vacuum, the MTBE removal efficiency of the column is achieved without the use of large noisy blowers that consume large amounts of electricity or tower packing that can become fouled due to hard water deposits. Noisy blowers and fouled packing are common drawbacks associated with air strippers commonly used in groundwater remediation.

The LSTE's VAT technology was recently evaluated using both a synthetic MTBE, petroleum hydrocarbon and chlorinated solvent mixed influent to simulate a commingled plume and contaminated groundwater from a gasoline service station where high concentrations of MTBE & gasoline were present in the groundwater.

The synthetic waste streams evaluated (simulated commingled plume) contained MTBE at concentrations of 620 and 340 parts per billion ("ppb") along with gasoline hydrocarbons, benzene, toluene, ethyl benzene and xylenes ("BTEX"), and the chlorinated hydrocarbons, trichloroethylene, perchloroethylene and 1,1,1-trichloroethane ("TCE, PCE, TCA"). The initial concentrations treated were approximately 1,500 ppb for gasoline hydrocarbons, 200 ppb for each BTEX compound, and 300 ppb for TCE, PCE & TCA.

The VAT effluent achieved an average MTBE removal efficiency of 77%. After continued treatment with the high-vacuum separator tower module, the MTBE removal increased to 92%.

The VAT achieved an average gasoline hydrocarbon removal efficiency of 91%; BTEX, TCE, PCE and TCA were removed with a 99% efficiency. Less than 1 ppb of BTEX, TCE, PCE and TCA were detected in the effluent from the VAT.

The LSTE-10 was also tested using contaminated groundwater from a service station undergoing groundwater remediation. The average **MTBE removal efficiency was 97%**. Similar removal efficiencies were obtained for petroleum hydrocarbons even though the groundwater was significantly contaminated.

The VAT and high vacuum separator tower are one component of the LSTE-10 modular "Plug & Play" platform. The LSTE-10 modular Plug & Play concept allows environmental remediation to be fine tuned to a specific project. The correctly sized equipment at the start of a project may quickly become a costly white elephant as the original equipment becomes oversized and unnecessary for the job at hand. The Plug and Play modular concept allows the right equipment to be used, as contaminant concentrations change during the course of the remediation. This flexibility insures overall cost effectiveness and reduces project maintenance and operation costs.

The 8 SCFM effluent air stream from the VAT and high vacuum separator column requires treatment to meet typical Air District requirements. The LSTE-10's modular platform allows the use of a catalytic oxidizer module. The need for the catalytic oxidizer (99%⁺ destruction efficiency) is entirely dependent on the mass of contaminants to be destroyed. The higher the concentration of contaminants to be treated, the more efficient and economical the catalytic oxidizer is to operate. If the concentration of contaminants to be removed is low, or at a concentration that it is not efficient or economical to operate the catalytic oxidizer, simple disposable carbon adsorbers are connected to the VAT (in place of the catalytic oxidizer) to treat the air stream. These adsorbers are much smaller than those required for standard air strippers due to the relatively low air flow to be treated. This reduces the noise, volume of carbon required for proper treatment of the contaminated air stream, and maintains the small foot print requirements for the total treatment unit. In general, carbon adsorbers require little to no maintenance, especially when compared to the catalytic oxidizer.

In summary, The LSTE's patent-pending vacuum aeration tank and high vacuum separator column have obtained a removal efficiency of 97%⁺ for MTBE during testing using actual contaminated groundwater. Petroleum hydrocarbons and chlorinated solvents were removed with over a 99% removal efficiency to a final concentration of less than 1 ppb. The VAT and high vacuum separator column modules are clearly the remediation equipment of choice for MTBE removal from groundwater.

The LSTE-10's modular Plug & Play platform allows for the use of the most appropriate and proper sized treatment module at the beginning of the remediation and is easily coupled with other LSTE modules to maintain efficient and cost effective remediation of soil vapor or contaminated groundwater throughout the project's life.